

# WEIL-McLAIN



## HE (Series 3) Gas-Fired, Induced Draft

### Boiler Manual



#### Includes:

- Installation
- Start-up
- Service
- Parts

Refer to Control Supplement  
for additional information

### BOILER MANUAL FOR USE BY A CERTIFIED HEATING SPECIALIST

- |                   |  |
|-------------------|--|
| To the owner:     | Regular service on this boiler is recommended and should be performed by a certified heating specialist. |
| To the installer: | Read all instructions and warranty before starting.<br>Refer to vent section before locating exhaust.    |

Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

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**IMPORTANT:** When calling or writing about the boiler, PLEASE GIVE THE MODEL, SERIES, AND C.P. NUMBER located on the boiler rating plate.

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### WARNING

**DO NOT USE PETROLEUM-BASED CLEANING OR SEALING COMPOUNDS IN BOILER SYSTEM.  
SEVERE DAMAGE TO THE BOILER WILL OCCUR.**

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning the life of the product.

#### **DANGER**

indicates presence of a hazard which *will* cause *severe* personal injury, death or substantial property damage if ignored.

#### **WARNING**

indicates presence of a hazard which *can* cause *severe* personal injury, death or substantial property damage if ignored.

#### **CAUTION**

indicates presence of a hazard which *will* or *can* cause minor personal injury or property damage if ignored.

#### **NOTICE**

indicates special instructions on installations, operation, or maintenance which are important but not related to personal injury hazards.

#### **WARNING**

**FAILURE TO FOLLOW ALL INSTRUCTIONS IN PROPER ORDER CAN CAUSE PERSONAL INJURY OR DEATH. READ ALL INSTRUCTIONS BEFORE INSTALLING.**

## Section I: Pre-Installation

### **CODES**

Installations must comply with all local codes, laws, regulations and ordinances, also United States National Fuel Gas Code ANSI Z223.1-1984. When required, installations must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, No. CSD-1. Safe lighting and other performance criteria were met with the gas manifold and control assembly provided on boiler when boiler underwent tests specified in ANSI Z21.13-1984 standard.

### **VENTING**

#### **WARNING**

**GIVE SPECIAL ATTENTION TO LOCATION OF VENT TO AVOID POSSIBILITY OF PROPERTY DAMAGE OR PERSONAL INJURY.**

1. Gases will form a white plume in winter.
2. Prevailing winds could cause freezing of condensate and water/ice build-up on building, plants or roof.
3. Plume could obstruct favorite window view.
4. Locate or guard the vent to prevent accidental contact by people or pets.
5. Vent must terminate at least 4 feet below, 4 feet horizontally from, or 1 foot above any door, window or gravity air inlet to the building. This vent must not be less than 7 feet above grade when located adjacent to public walkways.
6. DO NOT terminate vent into window well, stairwell, alcove, courtyard or other recessed area.

### **AIR SUPPLY FOR COMBUSTION**

#### **WARNING**

Adequate combustion and ventilation air must be provided to assure proper combustion and prevent the possibility of flue gas spillage.

1. In buildings of conventional frame, masonry or metal construction, infiltration is normally adequate to provide combustion air for boilers in unconfined rooms.
2. If the space is in a building of unusually tight construction, air should be obtained from outdoors or from spaces which freely connect with outdoors (see 4 below).
3. For boilers in confined rooms, two permanent openings shall be provided: one within 12 inches from the ceiling and one within 12 inches from the floor of the room. Each opening shall be at least one square inch per 1,000 BTUH boiler input, but must not be less than 100 sq. inches. These openings shall freely connect with areas having adequate infiltration from outside.
4. When all air is provided from outdoors the confined space shall be provided with two openings as outlined above. These openings shall connect directly or by ducts with outdoors or spaces (crawl or attic) that freely connect with the outdoors and shall be of the size listed below for that particular arrangement:
  - (a) One square inch per 4,000 BTUH of boiler input for direct outdoor air supply through an outside wall or through vertical ducting directly to outside.
  - (b) One square inch per 2,000 BTUH of boiler input for direct outdoor air through horizontal ducting.
  - (c) All ducting shall be of the same size as the opening to which it is connected with minimum dimensions of no less than 3 x 3 inches or 9 total square inches of area.
  - (d) Other size ducting must comply with local codes.

## MINIMUM SERVICE CLEARANCES

### Suggested for easy servicing:

- 24 inches for cleaning and servicing, left side.
- 18 inches for access to controls and components, front.
- 36 inches from top for cleaning flueways.
- 6 inches on remaining sides.

Screwdriver clearance for removal of jacket screws should be provided. If not, unions and shut-off valves should be installed in system so boiler can be moved for servicing.

### MINIMUM CLEARANCE FOR CLOSET INSTALLATIONS

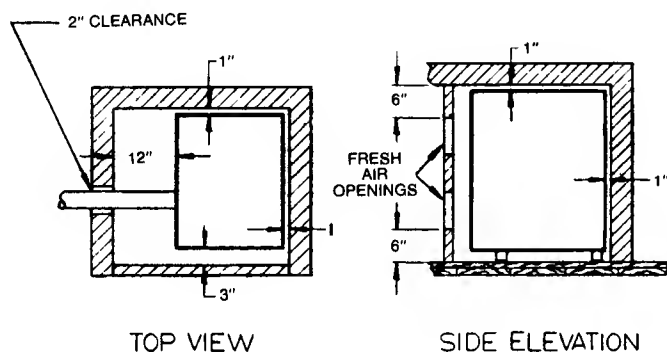


FIGURE 1

### RESIDENTIAL GARAGE INSTALLATION (ANSI Z223.1)

Install boiler so burners are at least 18 inches above the floor.

## FOUNDATION

HE boilers are approved for use on combustible flooring but **MUST NOT BE INSTALLED ON CARPETING.**

1. Level concrete or solid brick pad foundation is required if:
  - a) Water could flood area.
  - b) Non-level conditions exist.

MINIMUM BOILER FOUNDATION SIZES	
Number of Boiler Sections	Foundation Width "W"
3	12"
4	15"
5	18"
6	21"

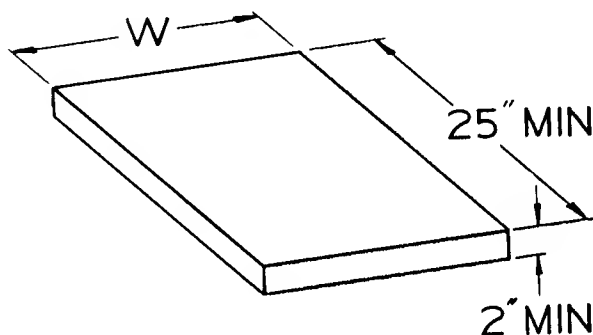


FIGURE 2

## Section II: Boiler Set-up

### PLACING THE BOILER

Leave boiler in crate and on pallet until installation site is ready.

1. Move entire crate and pallet next to selected location.
2. Remove crate.
3. Remove boiler from pallet as follows:
  - a. Tilt left side of boiler up and place a board under left legs.
  - b. Tilt boiler the other way and place a board under right legs.
  - c. Slide boiler backward off pallet and into position.

**DO NOT DROP BOILER OR BUMP JACKET ON FLOOR OR PALLET.**

4. Check level. Shim legs, if needed. Do not alter the legs.

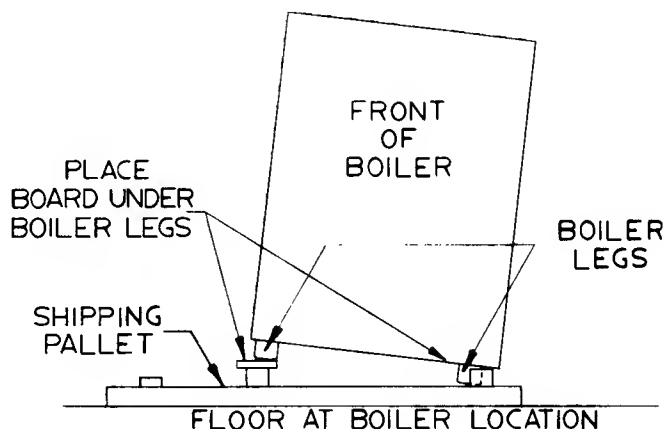
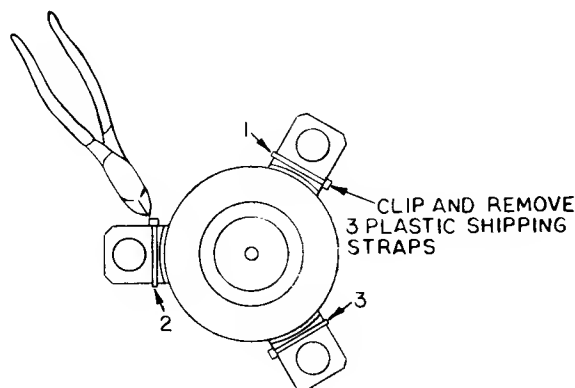


FIGURE 3

5. Remove blower shipping plastic straps.



**SHIPPING STRAP REMOVAL  
FIGURE 4**

6. Check for proper orifice sizing from chart below.
7. Check burner tubes for placement in their slots at the back with openings up. Make sure gas orifices inject down center of burner tubes.
8. Replace burner access panel and jacket door.

ORIFICE DRILL SIZES		
Type of Gas	Heating Value, BTU/cu. ft.	Std. Orifice Drill Size
Natural	1000	47
Propane	2500	56

#### CAUTION

Access panel must be secured in position during boiler operation to prevent momentary flame roll-out on ignition of main flame, which can melt the thermal fuse.

#### DANGER

NEVER JUMPER THERMAL FUSE OR A HAZARDOUS CONDITION WILL EXIST.

#### HYDROSTATIC PRESSURE TEST

Pressure test before attaching piping or electrical supply.

#### CAUTION

Leaks must be repaired at once or damage to the boiler can result. NEVER use petroleum based stop-leak compounds or leakage between the sections will occur.

1. Remove shipping nipple from supply outlet. Plug tapings, including compression tank tapping.
2. Connect water supply. Fill boiler and purge all air. TEST AT 45 PSIG for more than 10 minutes.

#### WARNING

Do not leave the boiler unattended. A cold water fill could expand and cause excessive pressure.

3. Make sure gauge pressure has been maintained.
4. Check for leaks. Repair, if found.
5. Drain boiler and remove testing plugs.
6. On initial start-up, check for leaks in system piping. If found, repair at once.

## Section III: Piping

#### CAUTION

Failure to properly pipe boiler may result in improper operation and damage to boiler or building.

#### RECOMMENDED BOILER AND SYSTEM PIPING FOR SINGLE ZONE (OR MULTIPLE ZONES WITH ZONE VALVES)

1. Pipe as shown in Figures 5 or 6.
2. Use low water cut-off when:
  - a. boiler is located above radiation level.
  - b. required by certain state, local, or territorial codes or insurance companies.

Use low water cut-off designed for water installations. Electrode probe type is recommended. Install in tee in supply piping.

3. If the system is to comply with ASME codes, an additional high temperature limit is needed. Purchase and install in supply piping from the boiler.

4.

#### WARNING

Relief valve discharge piping must be piped near floor close to floor drain to eliminate potential of severe burns. Do not pipe to any area where freezing could occur.

## 5. Expansion tank and air vent:

### a. For P-HE boilers—

- 1) Pre-pressurized expansion tank is provided. Ensure tank pressure and size will handle system fill and water volume.
- a) Fill pressure may be adjusted at tank for design conditions. Follow manufacturer's instructions.
- b) Additional tanks may be connected to tees in system near boiler. See Table I.
- 2) Install provided air vent.

### b) For HE boilers—

- 1) Size tank to system requirements. Refer to tank manufacturer's instructions and Table I.
- 2) Closed diaphragm pre-pressurized tank—locate near boiler.

### NOTICE

Install manual or automatic air vent in  $\frac{1}{2}$ " tapping as shown in Figure 6 when using closed diaphragm pre-pressurized tank.

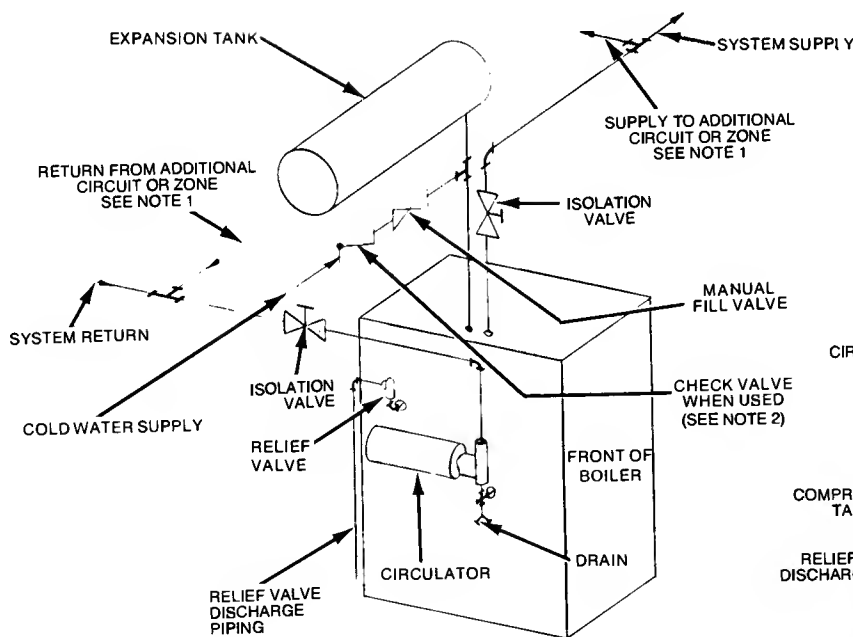
- 3) Closed type tank—connect from  $\frac{1}{2}$ " tapping (located behind supply outlet) to expansion tank. Use  $\frac{1}{2}$ " NPT piping. Any horizontal piping must pitch up towards tank 1" per 5 feet of piping.
- 4) Built-in air elimination system is provided. No additional device is needed if tank is piped as shown in Figure 5.

6. Connect supply, return, and cold water fill piping as shown in Figures 5 or 6.

TABLE I—EXPANSION TANK SIZING\*

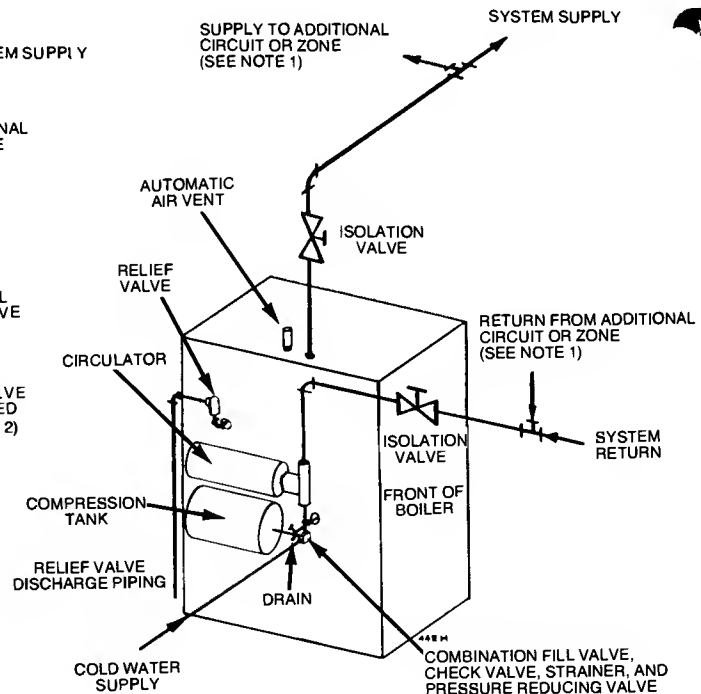
Number of Boiler Sections	Standard Fill-Trol Tank—Adequate for Series Loop Piping Systems with Convactor Baseboard	Additional Ex-Trol Tank Required for One Pipe Systems with Convactor Baseboard	** Additional Ex-Trol Tank(s) Required for Cast-Iron Radiators	Additional Ex-Trol Tank(s) Required for Cast-Iron Baseboard
3	No. 109*	—	No. 15	No. 15
4	No. 109*	No. 15	No. 15	No. 30
5	No. 109*	No. 15	No. 15	No. 30
6	No. 110*	—	No. 15	No. 30

- \* Tank selections based on 220°F. average system water temperature.
- \*\* Standard equipment for P-HE boilers.
- \*\*\* Systems with unusually large volumes of water may require additional expansion capacity.



- NOTES:
1. Use balancing valves or zone valves in each circuit for multiple circuit applications.
  2. Use backflow check valve where required by local codes.

HE BOILERS  
FIGURE 5



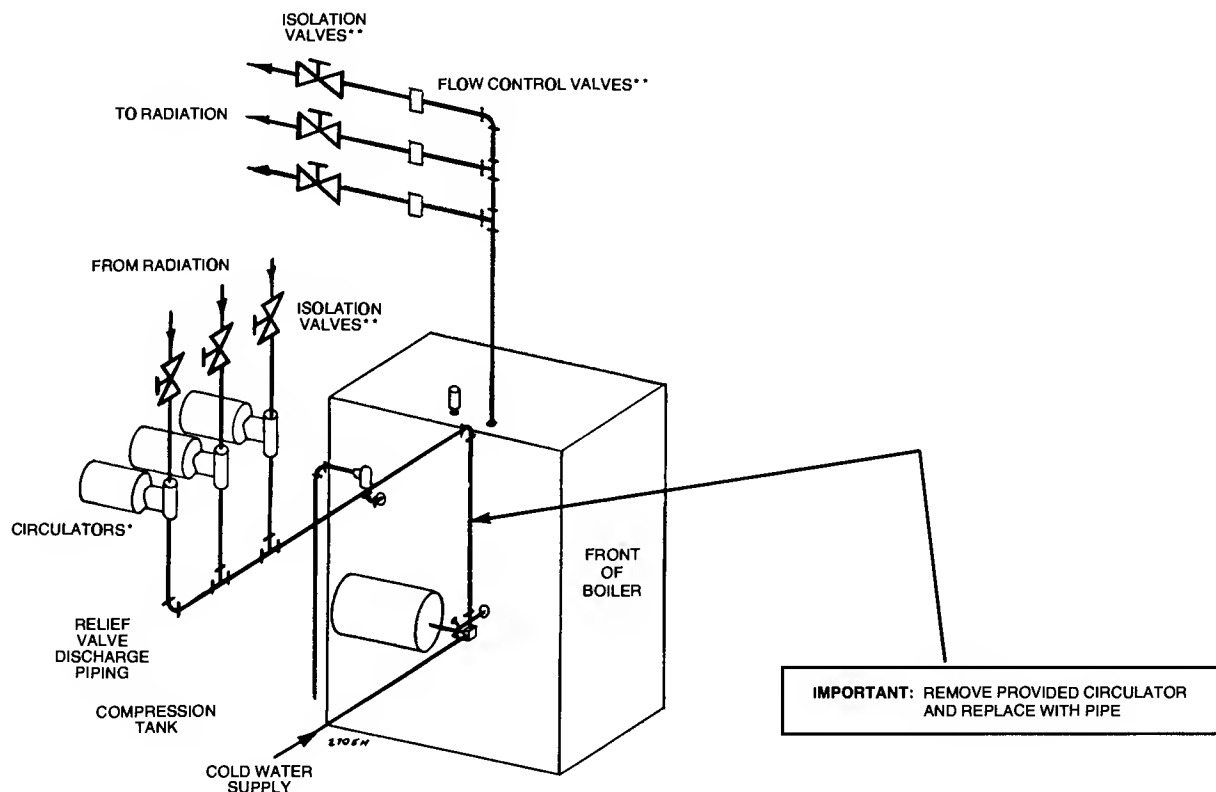
- NOTES:
1. Use balancing valves or zone valves in each circuit for multiple circuit applications.

P-HE BOILERS  
FIGURE 6

## MULTIPLE ZONING WITH CIRCULATORS

1. If multiple zoning with circulators, boiler must be repiped. See Figure 7.

- Remove provided circulator.
- Replace circulator with pipe.
- Determine if by-pass piping will be needed. See page 8.
- Mount circulators as shown.
- Install flow control valves.
- Follow remaining piping instructions.



\*DO NOT USE DRAIN COCK TAPPING  
 \*\*MAY BE INSTALLED IN ALTERNATE LOCATIONS

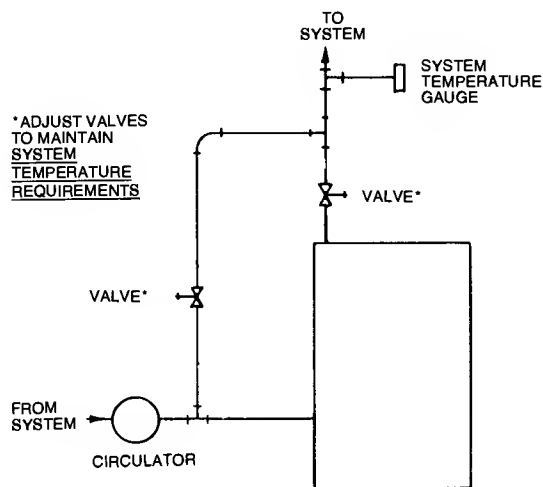
TYPICAL HE  
 MULTICIRCULATOR-ZONING  
 FIGURE 7

## BYPASS PIPING

BYPASS PIPING IS NOT NORMALLY REQUIRED ON ANY BASEBOARD SYSTEM.

Bypass piping should be used for the following installations. Bypass, supply, and return piping should be same size.

1. To protect system radiant panels, plaster, etc. from high temperature water supplied from boiler, see Figure 8.



HE BY-PASS PIPING  
FIGURE 8

2. To protect boiler from condensation formed by low water temperature returned from large water content converted gravity systems, etc., see Figure 9.

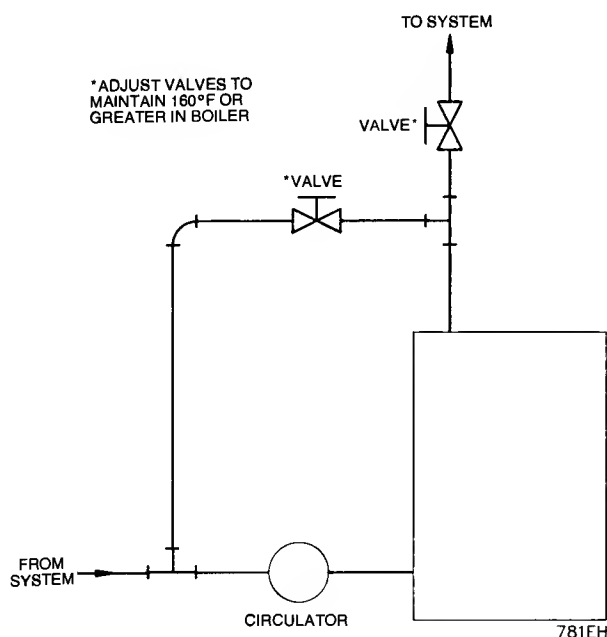


FIGURE 9

3. To protect boiler from condensation while protecting system from high water temperatures, as in large water content radiant ceiling panels, see Figure 10.

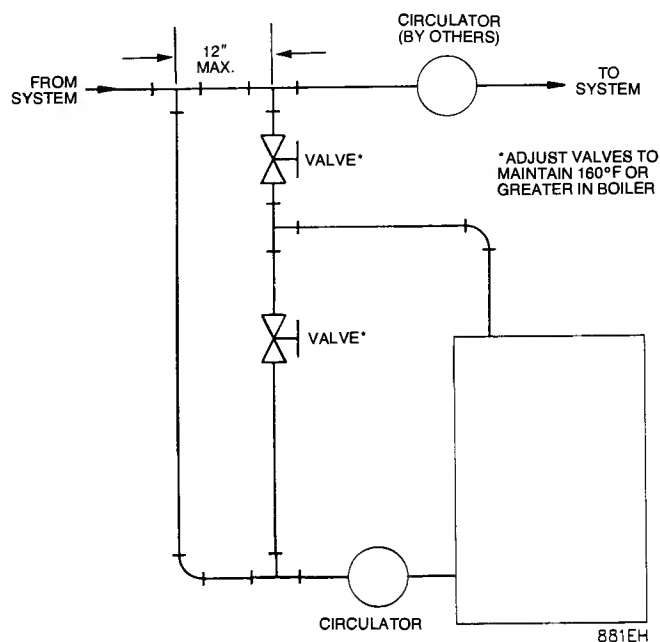
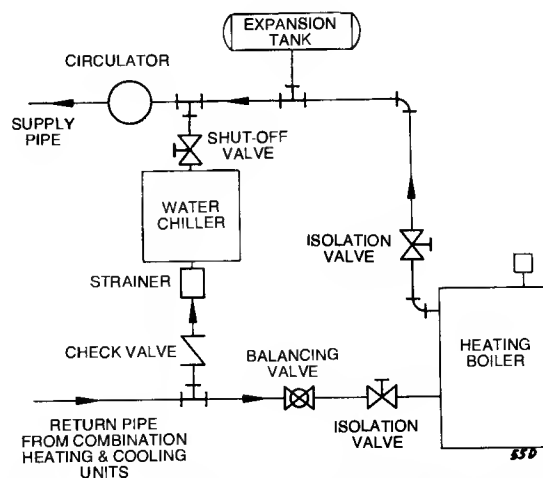


FIGURE 10

## USE WITH REFRIGERATION SYSTEM

The boiler must be installed so that chilled medium is piped in parallel with the heating boiler with appropriate valves to prevent the chilled medium from entering the boiler. Consult I=B=R Installation and Piping Guides.



RECOMMENDED PIPING FOR COMBINATION  
HEATING & COOLING (REFRIGERATION) SYSTEMS  
FIGURE 11



## Section IV: Venting

Determine venting method to use. Refer to following sections for installation details.

**CHIMNEY DRAFT VENTING**—natural draft  
**DIRECT EXHAUST**—for 3" vent pipe

**TABLE 2**

BOILER NO.	"D"—MINIMUM BREECHING SIZE
HE-3	4" DIA.
HE-4	5" DIA.
HE-5	5" DIA.
HE-6	5" DIA.

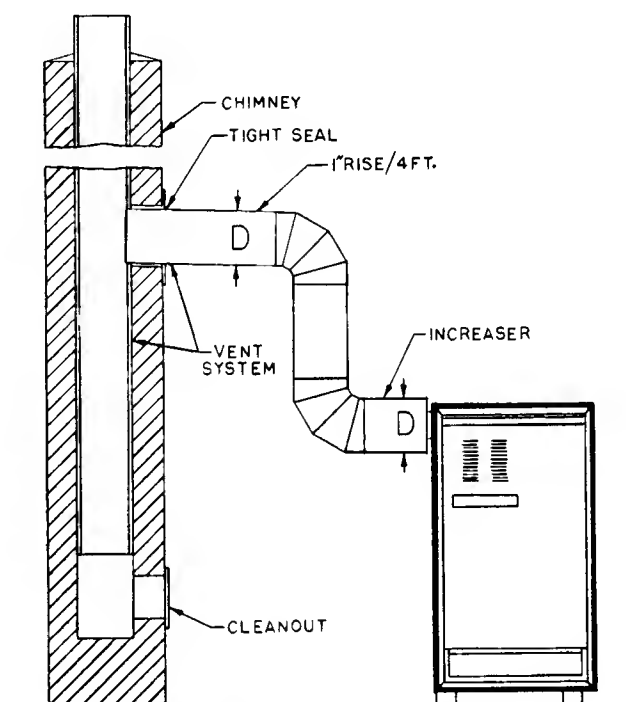
### CHIMNEY DRAFT VENTING

To prevent downdrafts, chimney should extend at least 2 feet above highest part of roof or other structure within 30 feet

Minimum chimney size listed on page 23 of manual. To vent with another appliance, see National Fuel Gas Code, ANSI Z223.1 Appendix G for sizing.

#### **DANGER**

Inspect existing chimney before installing boiler. Failure to clean or replace perforated pipe or tile lining will cause severe injury or death.



**CHIMNEY DRAFT VENTING  
INSIDE CHIMNEY  
FIGURE 12**

#### A. INSIDE CHIMNEY

Must be lined—vitreous tile lining recommended. See Figure 12 and Table 2.

1. Maintain two-inch clearance from combustible material to vent pipe.
2. Do not use chimney with open fireplace.
3. Inspect chimney and clean if needed.
4. Make horizontal runs as short as possible. Long runs can cause condensing.
5. When longer runs are used, support with appropriate hangers.
6. To prevent blockage, do not vent into bottom of chimney.
7. Vent pipe must not go beyond inside wall of chimney.
8. Vent passing through floors or ceilings must be fire-stopped.

#### B. OUTSIDE CHIMNEY (Masonry, decorative, etc. with one or more walls exposed to outside)

1. Can be used for chimney draft venting only when lined with corrosion-resistant metal liner. Provide condensate drain. Size liner per ANSI Z223.1. Increase breeching at boiler per Table 2.
2. Can be used as raceway for direct exhaust. See pages 10 and 11.

## DIRECT EXHAUST

### CAUTION

When removing appliance from common venting system, vent system may be too large for remaining appliance. Improper venting could result. Consult gas supplier for proper vent sizing.

### WARNING

GIVE SPECIAL ATTENTION TO LOCATION OF VENT TO AVOID POSSIBILITY OF PROPERTY DAMAGE OR PERSONAL INJURY.

- Gases will form white plume in winter.
- Plume could obstruct window view.
- Prevailing winds could cause freezing of condensate and water/ice build-up on building, plants or roof.
- Locate or guard vent to prevent accidental contact by people or pets.
- Vent must terminate at least 4 feet horizontally from, or 1 foot above any door, window or gravity air inlet to building. Vent must not be less than 7 feet above grade when located adjacent to public walkways.
- Terminate at least 6 feet from adjacent walls.
- Do not terminate into a window well, stairwell, alcove, courtyard or other recessed area.

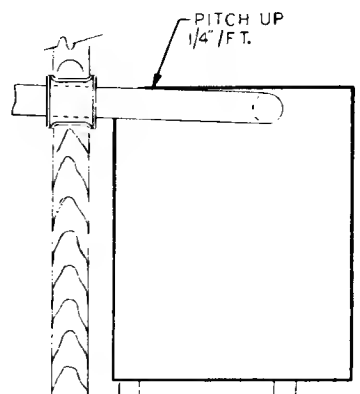
## VENTING PROCEDURE

- Determine entire vent length and number of elbows required. Actual venting system must not exceed limitations in charts below.

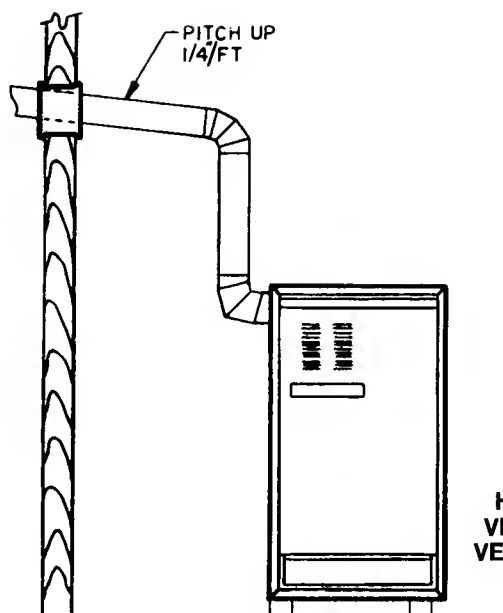
VENTING SYSTEM LENGTH vs NUMBER OF ELBOWS FOR 3" RIGID VENT					
Maximum Length—Feet	48	41	34	27	20
Maximum Number of Elbows	2	3	4	5	6

VENTING SYSTEM LENGTH vs NUMBER OF ELBOWS FOR 3" 304 STAINLESS STEEL FLEXIBLE VENT					
Maximum Length—Feet	48	38	31	24	17
Maximum Number of Elbows	0	1	2	3	4

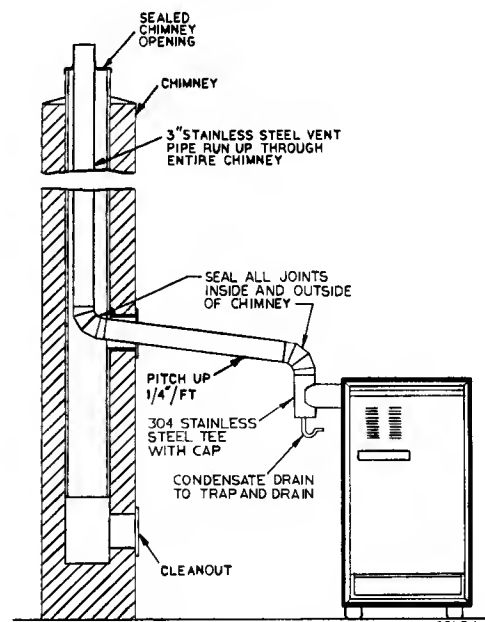
- Use 3-inch diameter vent pipe pitched up from boiler. Do not connect other appliances to this vent. See Figures 13 and 14 for thru-the-wall or Figure 15 for thru chimney. Vent pipe material:
  - Runs thru heated space (at least room temperature, i.e., inside chimney, etc.)—3" galvanized vent pipe.
  - Runs thru cold areas (below room temperature, i.e., chimney with one or more walls exposed to outside, etc.)—3" 304 or 316 stainless steel vent pipe and "Venting Thru Cold Areas" instructions, page 11.
- Seal all joints with approved silicone sealant (400°F).
- MAINTAIN TWO-INCH CLEARANCE from combustible materials to vent pipe.
- Long horizontal vent runs should be supported with appropriate hangers.



**HORIZONTAL VENTING  
FIGURE 13**



**HORIZONTAL VENTING WITH  
VERTICAL RISER  
FIGURE 14**

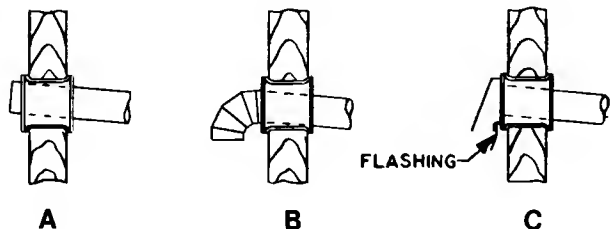


**VENTING THROUGH CHIMNEY  
FIGURE 15**

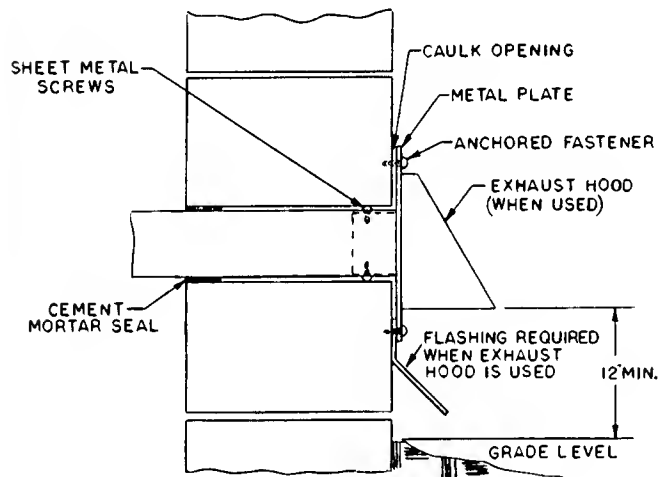
## VENTING THROUGH COLD AREAS

Extended runs through cold areas could cause condensation which must be drained away. 3" 304 or 316 stainless steel must be used as shown. Follow "Direct Exhaust" instructions, pages 10 and 11. Refer to Figure 15 or 19.

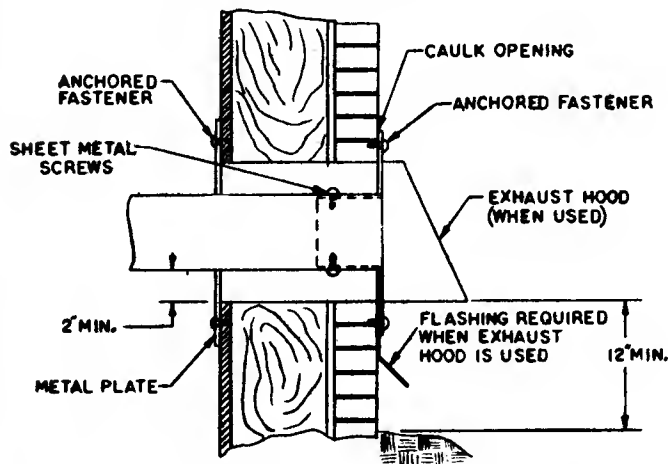
1. Crimped ends of flue pipe must point towards boiler.
2. Do not install seams of vent pipe on bottom of runs.
3. Tee and trap kit can be ordered from Weil-McLain, part no. 382-930-210.
4. Attach 304 stainless steel tee by drilling  $\frac{5}{32}$ " hole through  $\frac{1}{4}$ " hole in tee and attach with screw provided.
5. Attach drain trap to stainless steel tee with silicone sealant. Refer to Figure 19. Connect  $\frac{1}{2}$ " nominal  $\frac{5}{8}$ " O.D. tubing to trap and route to floor drain. Do not place drain where freezing could occur.



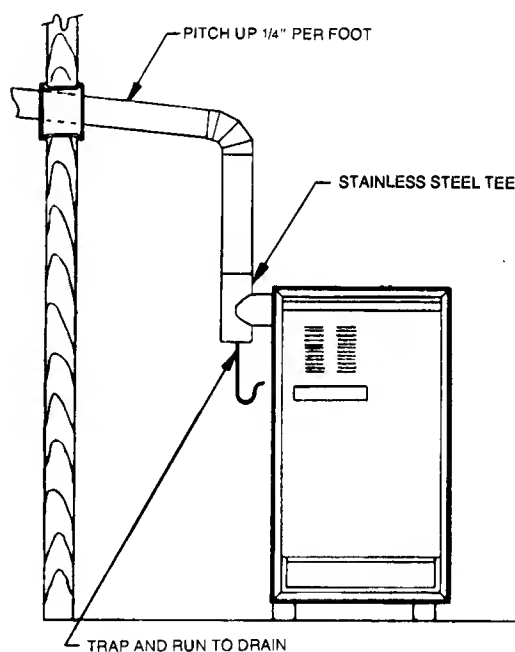
**DIRECT EXHAUST VENT TERMINATION**  
**FIGURE 16**



**HORIZONTAL VENTING—NON-COMBUSTIBLE WALL**  
**FIGURE 17**



**HORIZONTAL VENTING—COMBUSTIBLE WALL**  
**FIGURE 18**



**VENTING THROUGH COLD AREAS**  
**FIGURE 19**

## Section V: Gas Piping

Size gas piping considering:

- Diameter and length of gas supply piping.
- Number of fittings.
- Maximum gas consumption (including any possible future expansion).
- Allowable loss in gas pressure from gas meter outlet to boiler. This is specified as three-tenths of an inch water column. For additional pressure drops, see ANSI Z223.1.

1. For natural gas:

- Refer to following tables. To obtain cubic feet per hour, divide the input by 1000.
- Size for rated boiler input.
- Inlet gas pressure: 5" W.C. minimum  
13" W.C. maximum
- Manifold gas pressure: 3 1/2" W.C.
- Install 100% lock-up gas pressure regulator in supply line if inlet pressure exceeds 13" W.C. Adjust for 13" W.C. maximum.

**PIPE DELIVERY SCHEDULE**

Length of Pipe in Feet	*CAPACITY OF PIPE IN CUBIC FEET OF GAS PER HOUR				
	1/2"	3/4"	1"	1 1/4"	1 1/2"
10	132	278	520	1050	1600
20	92	190	350	730	1100
30	73	152	285	590	890
40	63	130	245	500	760
50	56	115	215	440	670
75	45	93	175	360	545
100	38	79	150	305	460
150	31	64	120	250	380

\* Flow determined by Dr. Pole's Formula—0.60 Specific Gravity, 0.30 inches water column pressure drop.

NOTE: For additional piping schedules, see ANSI Z223.1.

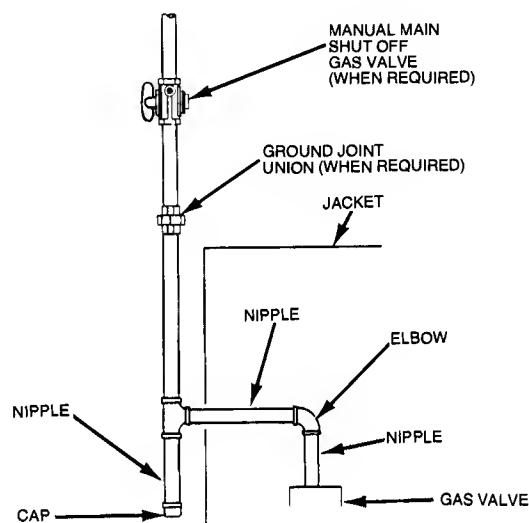
**ADDITIONAL LENGTH OF PIPE TO BE ADDED FOR  
EACH ELBOW OR TEE BEND IN THE LINE**

Pipe Size, Inches	Additional Length, Feet
1/2	1.3
3/4	1.7
1	2.2
1 1/4	2.9
1 1/2	3.3

2. For propane gas:

- Inlet gas pressure: 11" W.C. minimum  
13" W.C. maximum
- Manifold gas pressure: 10" W.C.
- Gas pressure regulator provided by gas supplier must be adjusted for maximum pressure of 13" W.C.
- Contact gas supplier to size pipes, tanks and regulator.

3. Remove jacket door and refer to Figure 20 for gas piping.



**GAS SUPPLY PIPING  
FIGURE 20**

- Follow good piping practices.
- Pipe joint compound (pipe dope) must be resistant to corrosive action of liquified petroleum gases and applied sparingly only to male threads of pipe joints.
- Install drip leg at inlet of gas connection to boiler. Where local utility requires drip leg be extended to the floor, use an appropriate length of pipe between the cap and tee.
- Install ground joint union to provide for servicing, when required.
- Install manual shut-off valve in gas supply piping outside boiler jacket when required by local codes or utility requirements.

9. Support piping by hangers, not by the boiler or its accessories.
10. Purge all air from supply piping.
11. Check factory installed piping and field installed piping for leaks—BUBBLE TEST.

### CAUTION

- a) DO NOT check for gas leaks with an open flame—BUBBLE TEST.
- b) Close manual main shut-off valve during any pressure testing at less than 13 inches water column.
- c) Disconnect boiler and gas valve from gas supply piping during any pressure test greater than 13 inches water column.

## Section VI: Wiring

Refer to wiring diagram label on jacket door and Control Supplement for specific wiring details.

### WIRING

#### WARNING

**For your safety, turn off electrical power supply at service entrance panel before making any electrical connections to avoid possible electrical shock hazard.**

All wiring must be installed in accordance with requirements of the National Electrical Code and any additional national, state, or local code requirements having jurisdiction. All safety circuit wiring must be N.E.C. Class 1.

The boiler must be electrically grounded in accordance with the National Electrical Code, ANSI/NFPA No. 70-1984. Use 90°C Thermoplastic Wire, or equivalent, if any original wire must be replaced.

The boiler is shipped with the control components completely wired.

A separate electrical circuit should be used for the boiler with a fused disconnect switch (15 amp. recommended). Bring electrical supply through proper opening in jacket left end panel and into electrical junction box. Wire electrical supply to leads in junction box as shown on the diagram.

### INSTALL ROOM THERMOSTAT

Install room thermostat on an inside wall. Never install where it will be influenced by drafts, hot or cold water pipes, lighting fixtures, television, sun rays or near a fireplace.

Heat anticipator in thermostat must be set to match power requirements of primary control to which it is connected.

Refer to wiring diagram on jacket door or in Control Supplement for recommended heat anticipator setting with standard equipment. Wire thermostat as shown.

## Section VII: Final Adjustments

### WATER TREATMENT

**Never use petroleum based stop-leak compounds.** Water seal deterioration will occur, resulting in leakage between sections.

Continual make-up water will reduce boiler life. Minerals can build up in the sections, reducing heat transfer, overheating the cast iron, and causing section failure.

For unusually hard water areas or low pH conditions (less than 7.0) consult local water treatment company.

#### Freeze protection (when used):

Use antifreeze especially made for hydronic systems. Inhibited propylene glycol is recommended. **DO NOT** use undiluted or automotive type antifreeze.

50% solution provides maximum protection to about -30°F. Local codes may require a back-flow preventer or actual disconnect from city water supply.

Determine quantity according to system water content. Boiler water content is listed on page 23.

Follow antifreeze manufacturer's instructions.

### FILL THE SYSTEM

1. Close manual air vents, drain cock, and automatic air vent, if used.
2. Fill to correct system pressure. Correct pressure will vary with each application. Residential systems are often designed for 12 pounds of cold fill pressure.
3. Open automatic air vent two turns, if used.
4. Open manual water feed valve.
5. a) Starting on the lowest floor, open air vents one at a time until water squirts out. Close vent.  
b) Repeat with remaining vents.
6. Close manual water feed valve when correct boiler pressure is reached.

### INSPECT BASE INSULATION

Check to make sure refractory is secure against all four sides of the base.

#### WARNING

If refractory material is damaged or displaced, call serviceman immediately. **DO NOT** operate boiler.

#### CAUTION

Ceramic fiber material used in boiler base insulation and gaskets can cause temporary skin, eye, and upper respiratory irritation.

Use NIOSH or MSHA approved protection when installing or removing this material.

### TO PLACE IN OPERATION

1. Verify boiler is filled with water.
2. Connect electric power supply.

3. Open manual main shut-off valve, if used, and gas cock on gas valve.

#### CAUTION

Burner access panel must be secured in position during boiler operation to prevent momentary flame roll-out on ignition of main flame, which can melt thermal fuse.

#### DANGER

**NEVER** jumper thermal fuse or hazardous condition will exist.

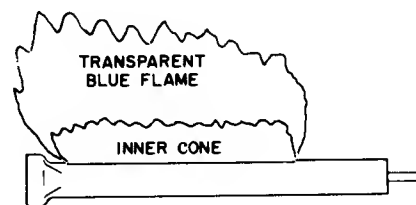
4. Move indicator on thermostat to call for heat.
5. If boiler fails to start, check for the following conditions:
  - a) Loose connections or blown fuse?
  - b) High limit set below boiler water temperature?
  - c) Thermostat set below room temperature?
  - d) Gas not turned on at meter and boiler?
  - e) Incoming gas pressure less than 5" W.C. or propane less than 10" W.C.?
  - f) Access panel not secured in place?
  - g) If above fails to eliminate problem, refer to Control Supplement.
6. Heat to approximately 210°F for 15 minutes to drive off dissolved gases. The high limit should be set above 210°F.
7. Check system piping for leaks. If found, repair immediately. **DO NOT** use petroleum based stop-leak compounds or damage to the boiler will occur.
8. Vent air from the system. Refer to steps 4 thru 6 under "Fill the System". Air in the system can interfere with water circulation and cause improper heat distribution.

### INSPECT VENTING SYSTEM

Check the gas-tight seal at all vent pipe connections.

### CHECK BURNER FLAMES

1. Proper burner flame, see Figure 21. Yellow-orange streaks may appear—caused by dust.
2. Improper flame:
  - a. Overfired—Flames large.
  - b. Underfired—Flames small.
  - c. Lack of primary air—Yellow tipping on flames; sooting will occur.



**TYPICAL  
MAIN BURNER  
FLAME  
FIGURE 21**

## Section VIII: Check-out Procedure

### CHECK-OUT PROCEDURE

Check-off steps as completed.

- ☐ 1. Boiler and heat distribution units filled with water?
- ☐ 2. Automatic air vent, if used, open two full turns during venting procedure?
- ☐ 3. Air purged from system?
- ☐ 4. Air purged from gas piping? Piping checked for leaks?
- ☐ 5. Follow operating instruction label on boiler for proper start-up. Also refer to "To Place in Operation", page 14.
- ☐ 6. Proper burner flame? Refer to "Check Burner Flames", page 14.
- ☐ 7. Test safety controls: If boiler is equipped with a low water cut-off or additional safety controls, test for operation as outlined by the manufacturer. Burners should be operating and should go off when controls are tested. When safety devices are restored, burners should reignite.
- ☐ 8. Test limit control: While burners are operating, move the indicator of the high limit control below actual boiler water temperature. The blower and burners should go off while the circulator continues to operate. Raise the limit control above the boiler water temperature and the burners should reignite.
- ☐ 9. Test ignition system safety device:
  - a. Connect voltmeter to gas valve terminals.
  - b. Turn off manual gas valve.
  - c. Set thermostat to call for heat.
  - d. Ignitor will glow for approx. 45 seconds. Near end of 45 seconds, 24VAC will show at gas valve for approximately 7 seconds and then return to 0 VAC.
  - e. To restart system, turn on gas, set thermostat back, then re-issue call for heat. Ignitor will heat up, trial for ignition occurs, and burners ignite.
- ☐ 10. High limit control set to the design temperature requirements of the system? Maximum high limit setting—220°F.
- ☐ 11. For multiple zones, flow adjusted so it is about the same in each zone?
- ☐ 12. Thermostat heat anticipator is set properly? Refer to wiring diagram on jacket door.
- ☐ 13. Boiler cycled with the thermostat? Raise to highest setting and verify boiler goes through normal start-up cycle. Lower to lowest setting and verify boiler goes off.
- ☐ 14. Measure gas input (natural gas only):
  - a. Operate boiler 10 minutes.
  - b. Turn off other appliances.
  - c. At natural gas meter, measure time (in seconds) required to use one cubic foot of gas.
  - d. Calculate gas input:
 
$$\frac{3600 \times 1000}{\text{number seconds from step C}} = \text{Btuh}$$
  - e. Btuh calculated should approximate input rating on rating plate.
- ☐ 15. For proper aspiration, the manifold gas pressure for natural gas should be 3½ inches water column and for propane gas should be 10 inches water column. Check manifold gas pressure by connecting a manometer to the downstream test tapping on the main gas valve.
- ☐ 16. Several operating cycles observed for proper operation?
- ☐ 17. Room thermostat set to desired room temperature?
- ☐ 18. Installation and Service Certificate on this page completed?
- ☐ 19. All instructions shipped with this boiler reviewed with owner or maintenance person, returned to envelope and given to owner or displayed near boiler?

## Installation and Service Certificate

BOILER MODEL \_\_\_\_\_ SERIES \_\_\_\_\_ CP NUMBER \_\_\_\_\_ DATE INSTALLED \_\_\_\_\_

BTU INPUT \_\_\_\_\_

- ☐ Installation instructions have been followed.
- ☐ Check-out sequence has been performed.
- ☐ Above information is certified to be correct.
- ☐ Information received and left with owner/maintenance person.

Installer \_\_\_\_\_  
(Company) (Address) (Phone) (Installer's Signature)

## Section IX: Maintenance

**Also Refer to Control Supplement Shipped With  
Boiler For Specific Control Operation and Troubleshooting**

### SUGGESTED MINIMUM MAINTENANCE SCHEDULE

#### Beginning of each heating season:

1. Annual service call by a qualified service agency.
2. Check burners and flueways for sooting. Use a mirror and flashlight to look up from base through sections. Call serviceman to clean, if necessary.
3. Visually inspect venting system for proper function, deterioration or leakage.
4. Visually inspect base insulation.
5. Check that boiler area is free from combustible materials, gasoline and other flammable vapors and liquids.
6. Check for and remove any obstruction to the flow of combustion or ventilation air to the boiler.
7. Follow procedure "To Place in Operation".
8. Visually inspect burner flames.
9. Check operation of safety devices. Refer to manufacturer's instructions.
10. Follow instructions on circulator to oil, if oil lubricated. Overoiling will damage the circulator. Water lubricated circulators do not need oiling.
11. Visually inspect condensate drain trap and hose for proper operation or deterioration.

#### Daily during heating season:

1. Check that boiler area is free from combustible materials, gasoline and other flammable vapors and liquids.
2. Check for and remove any obstruction to the flow of combustion or ventilation air to the boiler.

#### Periodically during heating season:

1. Check safety relief valve. Reference manufacturer's instructions on relief valve tag.
2. Test low water cut-off, if used. Reference manufacturer's instructions.
3. Visually inspect condensate drain trap and hose for proper operation or deterioration.

#### Monthly during heating season:

1. Check for leaks in the boiler and piping. If found, repair at once. **DO NOT** use petroleum based stop-leak compounds—leakage between the sections will occur.
2. Visually inspect burner flames.
3. Visually inspect venting system for proper function, deterioration or leakage.
4. Check automatic air vent for leakage.

#### Every six months:

Oil blower motor with S.A.E. oil as shown on motor.

#### End of each heating season:

1. Follow "Annual Shutdown Procedures".

### CLEANING BOILER HEATING SURFACES

After each heating season, remove front access panel to inspect burners and flues. Use a mirror and flashlight to look up from base through sections. If soot is found, contact your ser-

viceman to clean. The following cleaning procedure should only be done by a certified HE heating contractor. Properly adjusted gas boilers seldom need flue cleaning.

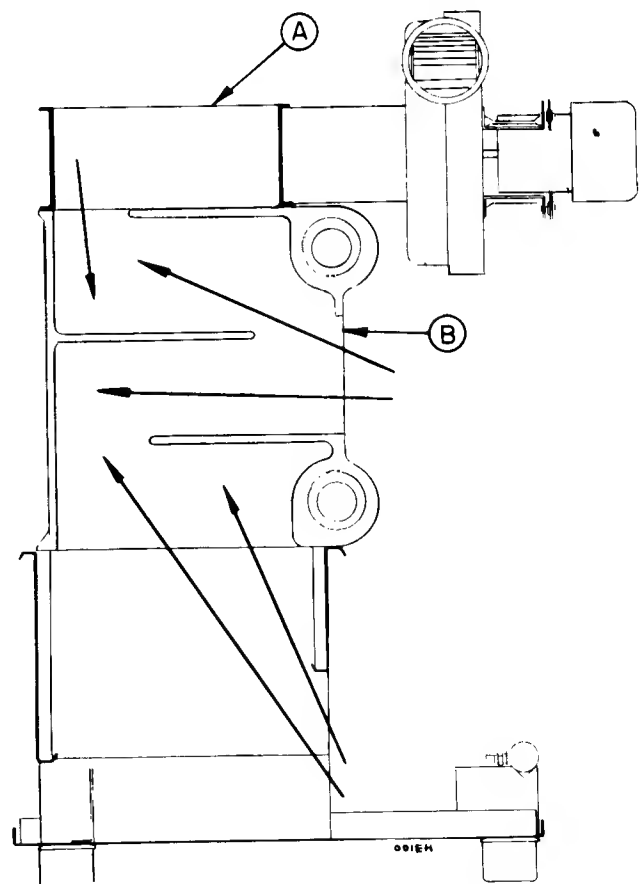
1. Shut down boiler.
2. Remove top jacket panels. Remove front and interior jacket panels.
3. Remove flue collector cover (A) and front cleanout cover (B).

#### CAUTION

Ceramic fiber material used in boiler base insulation and gaskets can cause temporary skin, eye, and upper respiratory irritation.

Use NIOSH or MSHA approved protection when installing or removing this material.

4. Remove burners. Vacuum or brush to remove dust and lint.
5. Thoroughly clean heating surfaces with a flue brush as illustrated.



**CLEANING BOILER HEATING SURFACES  
FIGURE 22**



- 6. Remove soot from boiler.
- 7. Replace burners.

**DANGER**

When replacing, burner tubes must be seated in the slots in the back with the openings facing up.

- 8. Replace flue collector cover and front cleanout cover. Re-seal with silicone sealant.
- 9. Replace jacket panels.
- 10. Start boiler following start-up procedure.

**ANNUAL SHUT-DOWN PROCEDURE**

- 1. When used, close manual main shut-off valve and gas cock on gas valve.
- 2. Disconnect electric power supply.
- 3. Move thermostat indicator to low setting.
- 4. DO NOT drain system unless exposure to freezing temperatures will occur. If antifreeze is used in the system, do not drain.
- 5. Open boiler drain cock to remove impurities that may have settled in the boiler (about a quart is all that is necessary to drain out). Refill to correct pressure.

**Section X: Replacement Parts**

**Parts Lists**  
**Component-Assemblies Replacement**  
(Refer to Control Supplement for control replacement)

<b>Selection Assembly</b> .....	<b>18</b>
<b>Base Assembly</b> .....	<b>19</b>
<b>Jacket Assembly</b> .....	<b>20</b>
<b>Flue Collector Assembly, Transition Assembly and Blower Cabinet Assembly</b> .....	<b>21</b>
<b>Boiler Trim Assembly</b> .....	<b>22</b>

**COMPONENT REPLACEMENT INSTRUCTIONS**

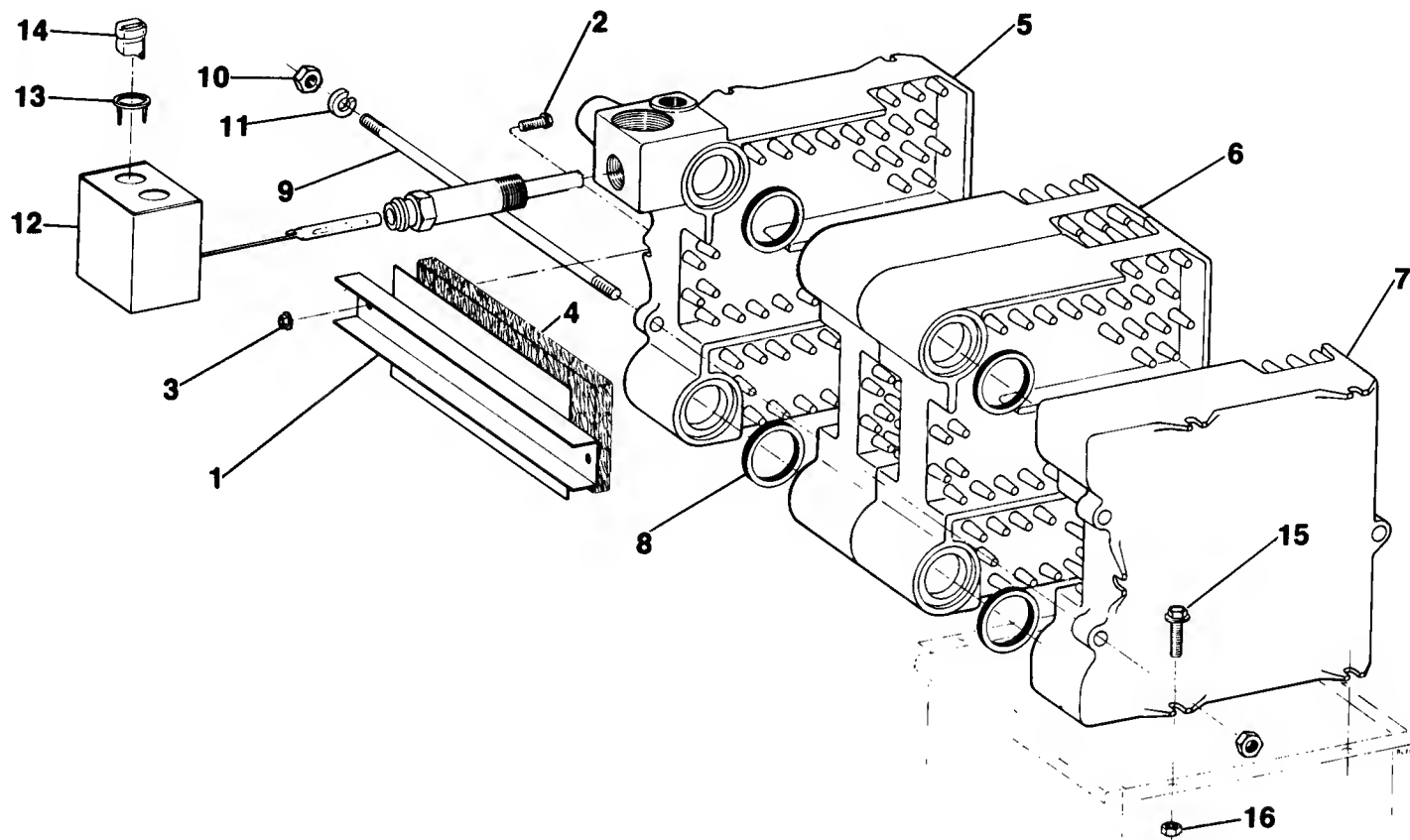
**Before replacing any parts on the boiler:**

- 1. Turn off power
- 2. Shut off gas supply

**Refer to the appropriate exploded diagram for parts replacement.**

**Replacement parts can be ordered or purchased through a local Weil-McLain distributor. When ordering, specify "Model HE (Series 3)" boiler and include description and number of replacement part. Some parts are stock items and can be purchased from a local supply house.**

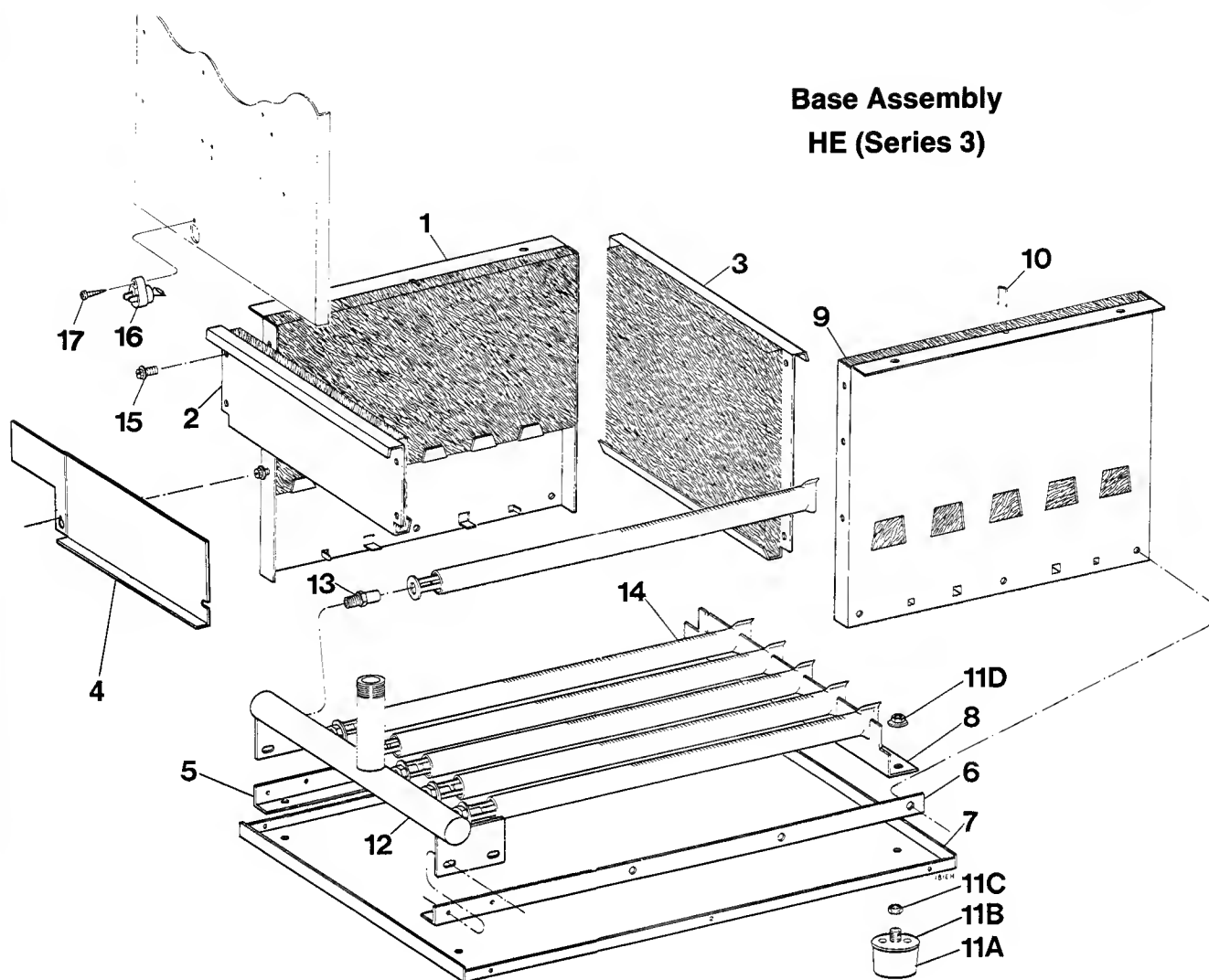
## Section Assembly HE (Series 3)



MODEL NO.		HE 3		HE 4		HE 5		HE 6	
NO.	PART DESCRIPTION	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.
1	Cleanout Plate	1	450-030-450	1	450-030-451	1	450-030-452	1	450-030-453
2	Screw, Whiz Lock 1/4"-20 x 1 1/4"	2	■	2	■	2	■	2	■
3	Nut, Whiz Lock 1/4"-20	2	■	2	■	2	■	2	■
4	Cerablanket Insulation	1	591-221-280	1	591-221-281	1	591-221-282	1	591-221-283
5	Left End Section 2914	1	312-900-000	1	312-900-000	1	312-900-000	1	312-900-000
6	Intermediate Section 2915	1	312-900-003	2	312-900-003	3	312-900-003	4	312-900-003
7	Right End Section 2918	1	312-900-006	1	312-900-006	1	312-900-006	1	312-900-006
8	Square Cut Seal 2"	4	592-800-011	6	592-800-011	8	592-800-011	10	592-800-011
9	Tie Rod	3	560-234-500	3	560-234-501	3	560-234-502	3	560-234-503
10	Nut, Hex 7/16"-14	6	■	6	■	6	■	6	■
11	Washer, Helical Spring Lock 7/16"	3	■	3	■	3	■	3	■
12	High Limit Control w/Well and Stop at 220°	1	■	1	■	1	■	1	■
13	Strain Relief Adapter	1	■	1	■	1	■	1	■
14	Strain Relief Bushing	1	■	1	■	1	■	1	■
15	Screw, Whiz Lock 5/16"-18 x 1"	4	■	4	■	4	■	4	■
16	Nut, Two Way Lock 5/16"-18	4	■	4	■	4	■	4	■

■ Standard hardware item, purchase locally.

## Base Assembly HE (Series 3)



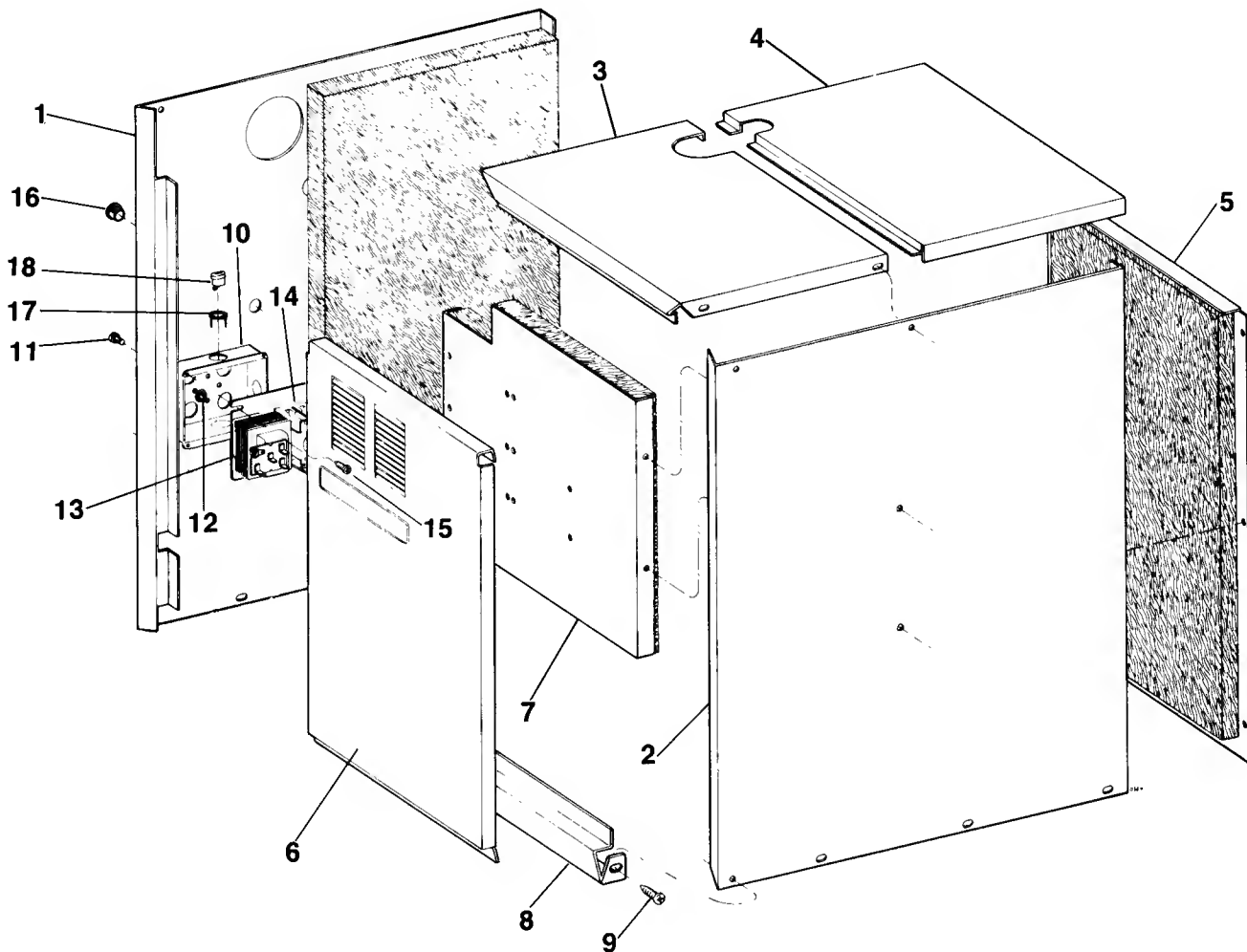
MODEL NO.		HE 3		HE 4		HE 5		HE 6	
NO.	PART DESCRIPTION	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.
1	Base Side Panel	2	460-003-710	2	460-003-710	2	460-003-710	2	460-003-710
2	Base Front Cross Tie	1	450-030-458	1	450-030-459	1	450-030-460	1	450-030-461
3	Base Back Cross Tie	1	450-030-462	1	450-030-463	1	450-030-464	1	450-030-465
4	Base Access Panel	1	450-030-644	1	450-030-645	1	450-030-646	1	450-030-647
5	Base Pan Angle—Left Hand	1	450-030-475	1	450-030-475	1	450-030-475	1	450-030-475
6	Base Pan Angle—Right Hand	1	450-030-474	1	450-030-474	1	450-030-474	1	450-030-474
7	Base Pan	1	450-030-454	1	450-030-455	1	450-030-456	1	450-030-457
8	Burner Rest	1	450-030-466	1	450-030-467	1	450-030-468	1	450-030-469
9	Base Insulation Set	1	591-222-070	1	591-222-071	1	591-222-072	1	591-222-073
	Staple 1 3/4" for base insulation	2	541-300-000	2	541-300-000	2	541-300-000	2	541-300-000
11	Leg, Screw-on Assembly*	4	590-424-252	4	590-424-252	4	590-424-252	4	590-424-252
11a	Leg	4	—	4	—	4	—	4	—
11b	Washer, with 3/16" hole	4	—	4	—	4	—	4	—
11c	Nut, 5/16"—18 Jam	4	—	4	—	4	—	4	—
11d	Nut, 5/16"—18 Whiz Lock Plated	4	—	4	—	4	—	4	—
	Screw, Machine Flat Head Phillips 5/16"—18 x 2 1/4"	4	—	4	—	4	—	4	—
12	Manifold	1	591-126-560	1	591-126-561	1	591-126-562	1	591-126-563
13	Orifice, Main Burner								
	Natural—#47	4	560-528-992	6	560-528-992	8	560-528-992	10	560-528-992
	Propane—#56	4	560-528-990	6	560-528-990	8	560-528-990	10	560-528-990
14	Burner, Steel	4	512-200-035	6	512-200-035	8	512-200-035	10	512-200-035
15	Screw, STP Type D Hex Wash Head Slot 10-32 x 3/16"	20	■	20	■	20	■	20	■
16	Thermal Fuse Element	1	512-050-230	1	512-050-230	1	512-050-230	1	512-050-230
17	Screw Philips, 8 x 3/4 Pan Hd.-A.	1	■	1	■	1	■	1	■

■ Standard hardware item, purchase locally.

\* Sold as assembly only.

— Part of assembly.

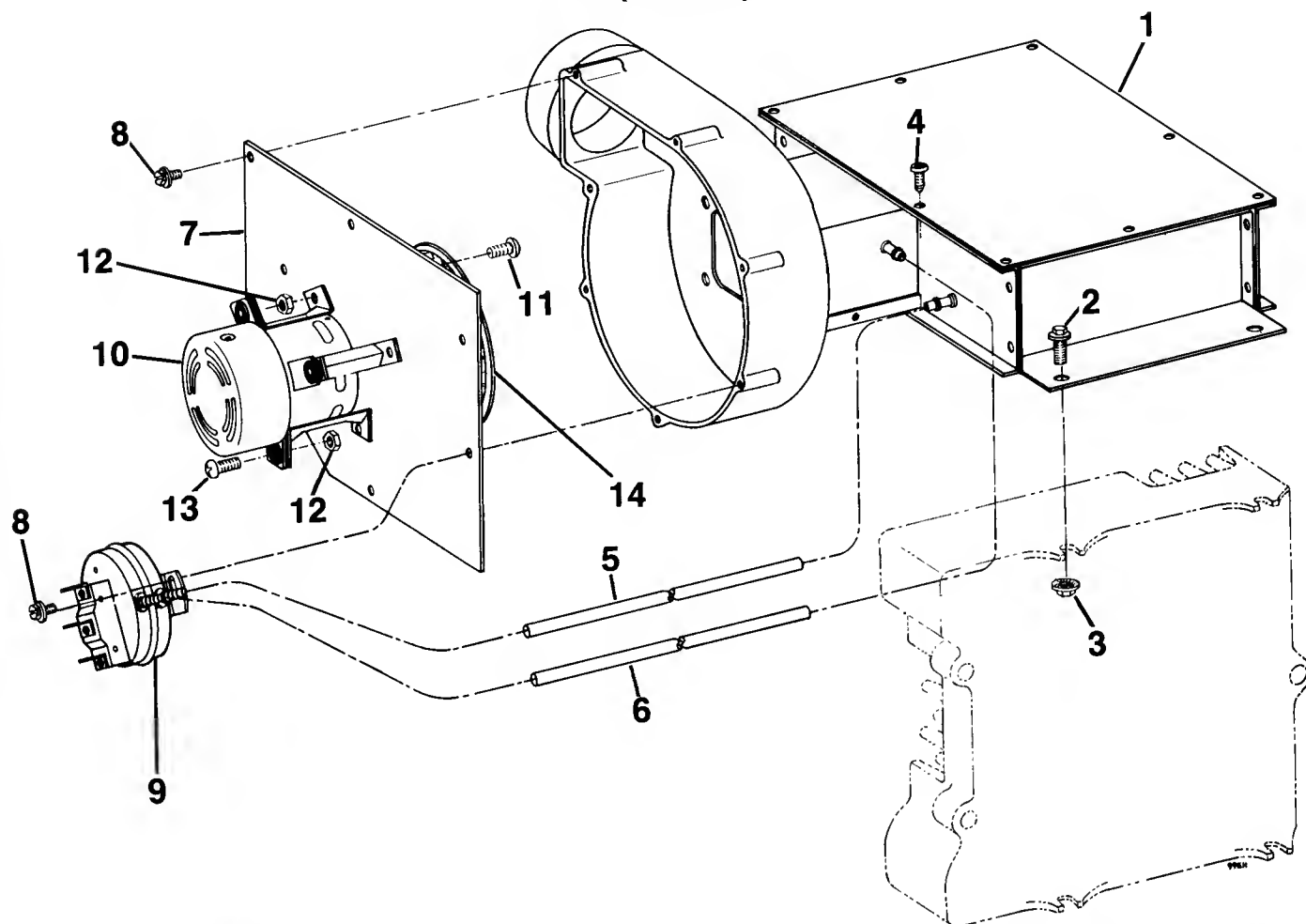
## Jacket Assembly HE (Series 3)



MODEL NO.		HE 3		HE 4		HE 5		HE 6	
NO.	PART DESCRIPTION	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.
1	Jacket, Left Hand Side Panel	1	422-901-161	1	422-901-161	1	422-901-161	1	422-901-161
2	Jacket, Right Hand Side Panel	1	422-901-160	1	422-901-160	1	422-901-160	1	422-901-160
3	Jacket, Front Top Panel	1	422-901-100	1	422-901-101	1	422-901-102	1	422-901-103
4	Jacket, Rear Top Panel	1	422-901-110	1	422-901-111	1	422-901-112	1	422-901-113
5	Jacket, Rear Panel	1	422-901-120	1	422-901-121	1	422-901-122	1	422-901-123
6	Jacket Door	1	422-901-130	1	422-901-131	1	422-901-132	1	422-901-133
7	Jacket, Interior Panel	1	422-901-140	1	422-901-141	1	422-901-142	1	422-901-143
8	Jacket, Front Bottom Cross Tie	1	422-901-150	1	422-901-151	1	422-901-152	1	422-901-153
9	Screw, Sheet Metal Pan-A Phil #10 x 1/2"	24	■	24	■	24	■	24	■
10	Junction Box 4" x 4" x 1 1/2"	1	■	1	■	1	■	1	■
11	Screw, Machine Pan Head Phillips 10-32 x 1/2"	1	■	1	■	1	■	1	■
12	Nut, Hex Green Plated 10-32	1	■	1	■	1	■	1	■
13	Transformer w/Plug In Receptacle and Bale Wire	1	▶	1	▶	1	▶	1	▶
14	Relay	1	▶	1	▶	1	▶	1	▶
15	Screw, Sheet Metal Pan-AB #8 Phil x 1/2"	2	■	2	■	2	■	2	■
16	Bushing, Thermostat Wire	1	■	1	■	1	■	1	■
17	Strain Relief Adapter	1	■	1	■	1	■	1	■
18	Strain Relief Bushing	1	■	1	■	1	■	1	■

■ Standard hardware item, purchase locally.

# **Flue Collector Assembly, Transition Assembly and Blower Cabinet Assembly HE (Series 3)**

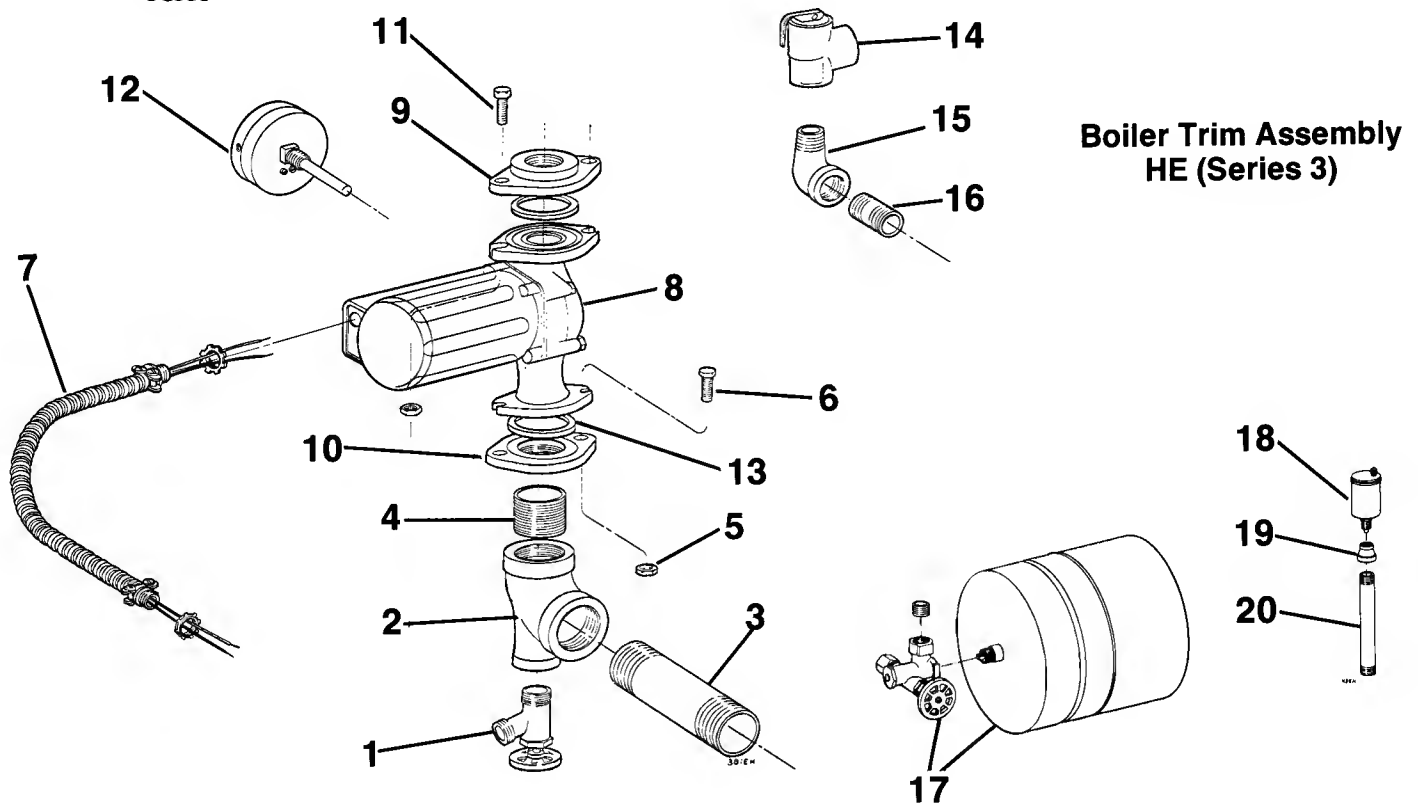


MODEL NO.		HE 3		HE 4		HE 5		HE 6	
NO.	PART DESCRIPTION	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.
1	Flue Collector Replacement Assembly* (flue collector, transition and blower housing)	1	450-030-392	1	450-030-393	1	450-030-394	1	450-030-395
2	Screw, Whiz Lock 1/4"-20 x 1 1/4" (For Flue Collector Assembly to Sections)	4	■	4	■	4	■	4	■
3	Nut, Whiz Lock 1/4"-20 (For Flue Collector Assembly to Sections)	4	■	4	■	4	■	4	■
4	Screw, Sheet Metal Type A Pan Head Phillips No.10 x 1/2" (For Flue Collector Top Panel)	6	■	8	■	8	■	10	■
5	Tubing, Silicone 1/8" ID x 12", White	1	590-317-630	1	590-317-630	1	590-317-630	1	590-317-630
6	Tubing, Silicone 1/8" ID x 12", Red	1	590-317-631	1	590-317-631	1	590-317-631	1	590-317-631
7	Blower Cabinet Assembly (blower wheel, cover plate, blower motor, motor mounting brackets, shock mounts, nuts and bolts)*	1	510-312-310	1	510-312-310	1	510-312-310	1	510-312-310
8	Screw, STP Type D Hex Wide Head SLT, No. 10-32 x 3/8" (For Blower Housing Cover Plate and Pressure Switch)	7	■	7	■	7	■	7	■
9	Pressure Switch▲	1	511-624-510	1	511-624-510	1	511-624-510	1	511-624-511
10	Replacement Motor Kit (motor, shock mounts)	1	382-930-225	1	382-930-225	1	382-930-225	1	382-930-225
11	Round Head Phillips Mach. Screw 10-32 x 3/8 SS	3	■	3	■	3	■	3	■
12	10-32 Hex 2-way Lock Nut	6	■	6	■	6	■	6	■
13	Round Head Phillips Mach. Screw 10-32 x 3/4 ZP	3	■	3	■	3	■	3	■
14	Blower Wheel	1	510-312-279	1	510-312-279	1	510-312-279	1	510-312-279

■ Standard hardware item, purchase locally.

\* Sold as assembly only.

▲ For high altitude pressure switch part number, see high altitude label attached to boiler.



**Boiler Trim Assembly  
HE (Series 3)**

MODEL NO.		HE 3		HE 4		HE 5		HE 6	
NO.	PART DESCRIPTION	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.	QTY.	PART NO.
1	Drain Valve 3/4"	1	■	1	■	1	■	1	■
2	Tee reducer black 1 1/4 x 3/4 x 1 1/4	1	■	1	■	1	■	1	■
3	Nipple 1 1/4" x 5"	1	■	1	■	1	■	1	■
4	Nipple, Close 1 1/4"	1	■	1	■	1	■	1	■
5	Nut, Hex 7/16"-14	4	■	4	■	4	■	4	■
6	Screw, Hex Head 7/16"-14 x 1 1/4"—SMALL PUMPS	2	■	2	■	2	■	2	■
	Screw, Hex Head 7/16"-14 x 1 1/2"—LARGE PUMPS	2	■	2	■	2	■	2	■
7	Wiring Harness, Box to Pump	1	■	1	■	1	■	1	■
8	Circulator, SMALL—TACO 007	1	511-405-113	1	511-405-113	1	511-405-113	1	511-405-113
	Circulator, SMALL-B&G LR20	1	511-405-112	1	511-405-112	1	511-405-112	1	511-405-112
***	Circulator, LARGE—B&G #100	1	511-405-115	1	511-405-115	1	511-405-115	1	511-405-115
	Circulator, LARGE—TACO #110	1	511-405-116	1	511-405-116	1	511-405-116	1	511-405-116
9	Pump Flange 1" B&G	1	563-910-010	1	563-910-010	1	563-910-010	1	563-910-010
	Pump Flange 1" TACO	1	563-910-011	1	563-910-011	1	563-910-011	1	563-910-011
10	Pump Flange 1 1/4" B&G	1	563-910-012	1	563-910-012	1	563-910-012	1	563-910-012
	Pump Flange 1 1/4" TACO	1	563-910-013	1	563-910-013	1	563-910-013	1	563-910-013
11	Screw, Hex Head 7/16"-14 x 1 1/2"—LARGE PUMPS	2	■	2	■	2	■	2	■
	Screw, Hex Head 7/16"-14 x 1 1/4"—SMALL PUMPS	2	■	2	■	2	■	2	■
12	Pressure-Temperature Gauge	1	510-218-099	1	510-218-099	1	510-218-099	1	510-218-099
13	Gasket, TACO—SMALL & LARGE PUMPS	2	590-317-543	2	590-317-543	2	590-317-543	2	590-317-543
	Gasket B&G LR20	2	590-317-541	2	590-317-541	2	590-317-541	2	590-317-541
	Gasket B&G 100	2	590-317-542	2	590-317-542	2	590-317-542	2	590-317-542
14	Relief Valve Female 30#	1	■	1	■	1	■	1	■
15	Street Ell, 3/4" Black for Female Valve	1	■	1	■	1	■	1	■
16	Nipple, 3/4" x 2" Black	1	■	1	■	1	■	1	■
17	Fill-Trol System #109 (P-HE 3-5 only)	1	510-632-086	1	510-632-086	1	510-632-086		
	Fill-Trol System #110 (P-HE 6 only)							1	510-632-087
18	Auto Air Vent (P-HE only)	1	510-148-562	1	510-148-562	1	510-148-562	1	510-148-562
19	Reducer 1/2" NPT x 1/4" NPT (P-HE only)	1	■	1	■	1	■	1	■
20	Nipple 1/2" x 6" (P-HE only)	1	■	1	■	1	■	1	■
***	Silicone Sealant (400°F—Dow 732 RTV or equivalent)	1	■	1	■	1	■	1	■
***	Retort Cement	1	■	1	■	1	■	1	■

■ Standard hardware item, purchase locally.  
\* Interchangeable parts.

\*\* Interchangeable parts.  
\*\*\* Not shown on drawing.

# RATINGS



DOE



WM

## HE BOILER (Series 3)

Water Boiler Number	A.G.A. Input BTU/Hr.▶	DOE Heating Capacity BTU/Hr.†	Net I-B-R Ratings-Water BTU/Hr.*	% DOE Seasonal Efficiency AFUE	Chimney Size**	Boiler Water Content (Gal.)
■HE-3	67,000	55,000	47,800	82.4	4" I.D. x 20'	1.54
■HE-4	100,000	82,000	71,300	82.3	5" I.D. x 20'	2.11
■HE-5	133,000	109,000	94,800	82.2	5" I.D. x 20'	2.69
■HE-6	167,000	137,000	119,100	82.2	5" I.D. x 20'	3.26

▶ For elevations above 2,000 ft. AGA ratings must be reduced. Contact Weil-McLain representative or distributor for details.

†Based on standard test procedures prescribed by the United States Department of Energy.

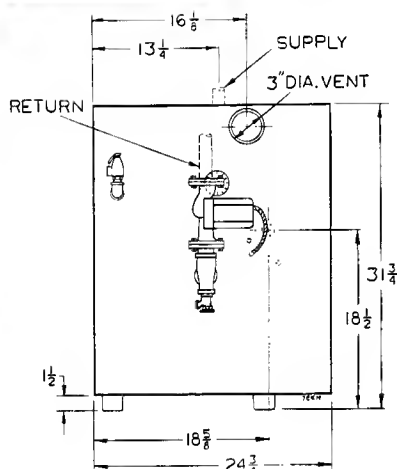
\* Net I-B-R ratings are based on net installed radiation of sufficient quantity for the requirements of the building and nothing need be added for normal piping and pick-up. Ratings are based on a piping and pick-up allowance of 1.15. An additional allowance should be made for unusual piping and pick-up loads. Consult Weil-McLain representative or distributor.

\*\* In special cases where surrounding conditions permit, chimney height may be reduced to 10 feet. HE boiler may be vented directly outside using 3" dia. vent pipe.

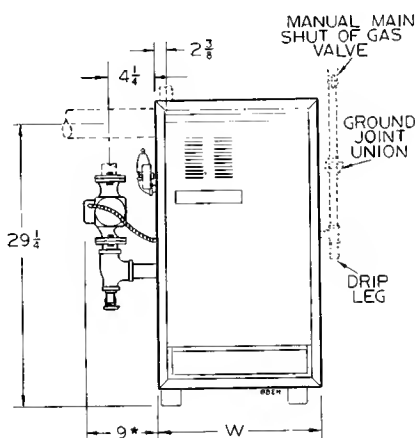
■Add "P-" to designator for boiler with Fill-Trol system (Example P-HE-3).

Boilers tested for 50 PSI working pressure.  
HE boilers not available for millivolt systems.

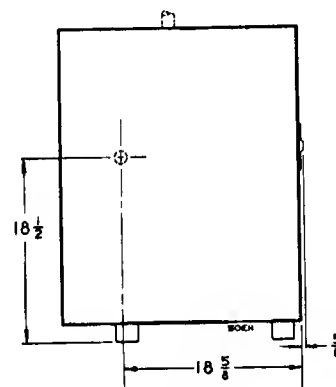
## DIMENSIONS



LEFT END



FRONT



RIGHT END

\*With Fill-trol tank, add 4 1/4" (P-HE6 only).

Water Boiler Number	Supply	Copper HE Return	Boiler Width W	Gas Connection Size	Crate Dimensions (outside measurements—in.)			Approx. Shipping Wt.—Lbs.	
					Length	Width	Height	HE	P-HE
HE-3	1 1/4" N.P.T.	1" N.P.T.	11 1/4"	1/2"	28	28	35	217	242
HE-4	1 1/4" N.P.T.	1" N.P.T.	14 1/4"	1/2"	28	28	35	268	293
HE-5	1 1/4" N.P.T.	1" N.P.T.	17 1/4"	1/2"	28	34	35	319	335
HE-6	1 1/4" N.P.T.	1" N.P.T.	20 1/4"	1/2"	28	34	35	370	387

Gas piping from meter to be sized according to local utility requirements.

## STANDARD EQUIPMENT

Insulated Steel Jacket  
Flue Gas Collector Assembly with Close-off  
Blower and Motor Assembly  
Aluminized Steel Burners  
Combination Step-Opening Gas Control Valve (includes main valve, redundant valve, pressure regulator, pilot filter, and manual main shutoff valve) for 24 Volt  
Hot Surface Ignition System  
Pressure Switch  
Thermal Fuse Element  
Electrical Junction Box  
Combination Relay Receptacle and 40 VA Transformer  
Plug-in Circulator Relay  
High-Limit Temperature Control  
Circulator—1-Inch, All Sizes

Built-In Air Eliminator  
30 PSI ASME Safety Relief Valve  
Combination Pressure-Temperature Gauge  
Drain Valve  
Fill-Trol System (compression tank, fill and check valve, automatic air vent, and fittings—#109 Sizes 3 through 5; #110 Size 6) for P-HE Only

## ADDITIONAL EQUIPMENT

Weil-McLain DWS Domestic Water Heating System (includes heat exchanger and circulator/adaptor)